

IN THE CLAIMS

1. (Currently Amended) A method for structured document transcoding comprising:

generating, in response to receiving ~~a source document from an element of a~~ a structured document including a first ordered list of document elements in a markup language, a source document based on a document element of the first ordered list of document elements, the source document including a second ordered list of document elements in the markup language ~~replacing the element to update the structured document;~~
replacing the document element with the second ordered list of document elements to insert the source document into the first ordered list of document elements to update the structured document;

building a document tree including a plurality of tree nodes associated with document elements ~~of from the source document and the updated structured document;~~

generating a plurality of new document trees ~~from~~ according to the document tree such that the plurality of new document trees are ordered and hierarchically linked, the new document trees being associated with new document elements;

determining sizing parameters for one or more new tree nodes of at least one of the new document trees; and

producing, from at least one of the new document trees, one structured data such that it is suitable for ~~input to a browser~~ in a browser to render in a browser device,

wherein the one or more new tree nodes including one root node and one or more leaf nodes, the determined sizing parameters of the root node satisfying constraints associated with a display area and processing capacity for the browser, each of the one or more new tree nodes except the root node having a single parent node belonging to the one or more new tree nodes and each of the one or more new tree nodes except the one or more leaf nodes having at least one child node belonging to one or more new tree nodes, and wherein each leaf node is associated with no more than one of the plurality of new document trees.

2. (Previously Presented) The method of claim 1 wherein the sizing parameters include minimum display width.

3. (Canceled)

4. (Previously Presented) A method of transcoding a source structured document in a markup language for a browser to render while satisfying constraints from a display area and processing capacity of a browser device, the constraints including a plurality of layout constraints, the method comprises:

building a document tree from the source structured document;
assigning one or more layout constraints and sizing parameters to a plurality of tree nodes of the document tree;
splitting or partitioning an oversized tree node of the plurality of tree nodes into one or more new tree nodes of new document trees
that satisfy one of the plurality of layout

constraints wherein the new document trees are hierarchically linked; and ordering the new document trees in an order consistent with a two-dimensional navigation sequence of a display page for the source structured document, wherein at least one new tree node of the new document trees including sizing attributes scalable to satisfy the constraints for at least one of the new document trees to produce one structured data such that it is suitable for input to the browser, wherein the at least one new document tree comprises one or more new tree nodes including one root node and one or more leaf nodes, each new tree node except the root node having a single parent node in the one or more new tree nodes, each of the one or more new tree nodes except the one or more leaf nodes having at least one child node in the one or more new tree nodes, and each leaf node belonging to no more than one of the new document trees.

5. (Previously Presented) The method of claim 4 wherein the two-dimensional navigation sequence is top-to-down coupled with either left-to-right or right-to-left.

6. (Canceled)

7. (Canceled)

8. (Currently Amended) The method of claim 1 wherein the generating the source document comprises executing executable codes included in the document element to provide dynamic document elements in the source document.

9. (Previously Presented) The method of claim 8, wherein the executable codes include script codes.

10. (Previously Presented) The method of claim 9, wherein the executing is based on a document object model according to the structured document.

11. (Currently Amended) The method of claim 1, wherein the generating the source document comprises retrieving the source document based on a link data included in the document element.

12. (Canceled)

13. (Canceled)

14. (Previously Presented) The method of claim 11 wherein the retrieving comprises sending an HTTP request according to the link data and receiving an HTTP response.

15. (Previously Presented) The method of claim 11 wherein the retrieving comprises sending an HTTPS request according to the link data and receiving an HTTPS response.

16. (Currently Amended) The method of claim 11 wherein the document element is associated with a FRAME element or an IFRAME element.

17. (Canceled)

18. (Previously Presented) The method of claim 4 wherein the partitioning comprises selecting a set of descendant nodes of the second oversized tree node such that at least one selected descendant node is associated with at least one of the one or more layout constraints assigned to the second oversized tree node;

establishing a partition tree by copying or relocating corresponding tree nodes from the document tree to the partition tree such that

- (i) at least one sub tree rooted at one of the selected set of descendant nodes gets removed from the document tree;
- (ii) an ancestor tree node of the one of the selected set of descendant nodes has more than one child nodes copied from the document tree; and
- (iii) ordering relationships among tree nodes of the partition tree is the same as that of the corresponding tree nodes in the document tree; and

inserting cross linking nodes to the partition tree and the document tree to create a corresponding hierarchical linking relationship.

19. (Previously Presented) The method of claim 4 wherein the ordering comprises inserting cross-linking nodes to the new document trees to cause at least one of the new document

trees resulting from the partitioning to have references to its neighboring new document trees according to the order.

20. (Previously Presented) The method of claim 1, further comprising:

assigning a target browser display width to the root node of the at least one new document tree as a maximum width allowed for the root node;

deciding a maximum width allowed for at least one new tree node of the at least one new document tree given a maximum width allowed for its single parent node such that a minimum width sizing parameter assigned to the single parent node has a value no greater than the given maximum width;

determining a scaling factor for the at least one new tree node; and

applying the scaling factor to sizing attributes of new document elements associated with the at least one new tree node.

21-23. (Canceled)

24. (Previously Presented) The method of claim 1 wherein the generating a plurality of new document trees comprises converting at least one tree nodes to at least one new tree nodes associated with one or more new document elements, the one or more new document elements being associated with a second markup language.

25. (Previously Presented) The method of claim 1 wherein the markup language is HTML.

26. (Previously Presented) The method of claim 24 wherein the second markup language is HTML, CHTML, XHTML, XML, WML or HDML.

27. (Previously Presented) The method of claim 26 wherein the converting converts the one or more tree nodes associated with FRAMESET elements into the one or more new tree nodes associated with TABLE elements.

28. (Previously Presented) The method of claim 26 wherein the converting converts the one or more tree nodes associated with FRAME elements into the one or more new tree nodes associated with TD elements.

29. (Previously Presented) The method of claim 4 wherein the one or more layout constraints assigned to the plurality of tree nodes include a vertical column or a horizontal row over a set of descendant nodes of one of the plurality of tree nodes.

30. (Previously Presented) The method of claim 4 wherein the sizing parameters comprises a scalable width, a minimum width, an image area and a character number.

31. (Previously Presented) The method of claim 4 wherein one of the sizing parameters assigned to one of the plurality of tree nodes is a cumulative summation of corresponding values of the same sizing parameter of one or more of its child nodes.

32. (Previously Presented) The method of claim 29 wherein a value of one of the sizing parameters is determined as a cumulative summation, over a set of the one or more layout

constraints assigned to the one of the plurality of tree nodes, of maximum corresponding value of the same sizing parameter within the set of descendant nodes associated with the set of the one or more layout constraints.

33. (Previously Presented) The method of claim 29 wherein one of the sizing parameters assigned to the one of the plurality of tree nodes has a value is no less than at least one corresponding value of the same sizing parameter of the set of descendant nodes associated with the vertical column constraint.

34. (Previously Presented) The method of claim 29 wherein one of the sizing parameters assigned to the one or the plurality of tree nodes has a value no less than a cumulative summation of at least one corresponding value of the same sizing parameter of the set of descendant nodes associated with the horizontal row constraint.

35. (Previously Presented) The method of claim 30 wherein the minimum width sizing parameter of the oversized tree node has a value exceeding a width threshold value associated with the one of the plurality of layout constraints.

36. (Previously Presented) The method of claim 29 wherein the splitting or partitioning modifies the horizontal row layout constraint assigned to the oversized tree node.

37. (Previously Presented) The method of claim 1 wherein the generating a plurality of new document trees comprises composing a catalog document tree, containing tree nodes linked to the new document trees, to provide a summary sizing information for at least one

new document tree and the hierarchical linking relationship amongst the new document trees.

38. (Previously Presented) The method of claim 1 wherein the structured data is a structured document in a second markup language.

39. (Previously Presented) The method of claim 1 wherein the browser device is palmtops, PDAs or data enabled cell phones wirelessly connected with a small display areas and processing capacities.

40. (Currently Amended) A computer readable medium encoded with a plurality of computer-executable instructions which, when executed by a processing system causes the processing system to perform a method for structured document transcoding, the method comprising:

generating, in response to receiving a source document from an element of a structured document including a first ordered list of document elements in a markup language, a source document based on a document element of the first ordered list of document elements, the source document including a second ordered list of document elements in the markup language replacing the element to update the structured document;

replacing the document element with the second ordered list of document elements to insert the source document into the first ordered list of document elements to update the structured document;

building a document tree including a plurality of tree nodes associated with

document elements of from the source document and the updated structured document;

generating a plurality of new document trees from-according to the document tree such that the plurality of new document trees are ordered and hierarchically linked;

determining sizing parameters for one or more new tree nodes of at least one of the new document trees; and

producing, from the at least one new document trees, one structured data such that it is suitable for input to a browser to render in a browser device, wherein the one or more new tree nodes including one root node and one or more leaf nodes, the determined sizing parameters of the root node satisfying constraints associated with a display area and processing capacity for the browser, each of the one or more new tree nodes except the root node having a single parent node belonging to the one or more new tree nodes and each of the one or more new tree nodes except the one or more leaf nodes having at least one child node belonging to one or more new tree nodes, and wherein each leaf node is associated with no more than one of the plurality of new document trees.

41. (Previously Presented) The computer readable medium of claim 40 wherein the sizing parameters include minimum display width.

42. (Canceled)

43. (Previously Presented) A computer readable medium encoded with a plurality of computer-executable instructions which, when executed by a processing system, causes a data processing system to perform a method for transcoding a source structured document in a markup language for a browser to render a display page while satisfying constraints from a display area and processing capacity of a browser device, the constraints including a plurality of layout constraints, the method comprising:

building a document tree from the source structured document;

assigning one or more layout constraints and sizing parameters to a plurality of tree nodes of the document tree;

splitting or partitioning an oversized tree node of the plurality of tree nodes into one or more new tree nodes of new document trees that of tree nodes satisfy one of the plurality of layout constraints, wherein the new document trees are hierarchically linked; and

ordering the new document trees in an order consistent with a two-dimensional navigation sequence of a display page for the source structured document, wherein at least one new tree node of the new document trees including sizing attributes scalable to satisfy the constraints for at least one of the new document trees to produce one structured data such that it is suitable for input to the browser, wherein the at least one new document tree comprises one or more tree nodes including one root node and more leaf nodes, each new tree node except the root node having a single parent node in the one or more new tree nodes, each of the one or more new tree nodes except the one or more leaf nodes having at least one child node in the one or more new tree nodes, and each leaf node belonging to no more than one of the new

document trees.

44. (Cancelled)

45. (Currently Amended) The computer readable medium of claim 40, wherein the generating the source document comprises executing executable codes included in the document element to provide dynamic document elements in the source document.

46. (Currently Amended) The computer readable medium of claim 40, wherein the generating the source document comprises retrieving the source document based on a link data included in the document element.

47. (Previously Presented) The computer readable medium of claim 43 wherein the partitioning comprises

selecting a set of descendant nodes of the second oversized tree node such that at least one selected descendant node is associated with at least one of the one or more layout constraints assigned to the second oversized tree node;

establishing a partition tree by copying or relocating corresponding tree nodes from the document tree to the partition tree such that

(i) at least one sub tree rooted at one of the selected set of descendant nodes gets removed from the document tree;

(ii) an ancestor tree node of the one of the selected set of descendant nodes has more than one child nodes copied from the

document tree; and

(iii) ordering relationships among tree nodes of the partition tree is the same as that of the corresponding tree nodes in the document tree; and

inserting cross linking nodes to the partition tree and the document tree to create a corresponding hierarchical linking relationship.

48. (Previously Presented) The computer readable medium of claim 41 further comprising:

assigning a target browser display width to the root node of at least one the new document tree as a maximum width allowed for the root node;

deciding a maximum width allowed for at least one new tree node of the at least one new document tree given a maximum width allowed for its single parent node such that a minimum width sizing parameter assigned to the single parent node has a value no greater than the given maximum width;

determining a scaling factor for the at least one new tree node; and

applying the scaling factor to sizing attributes of new document elements associated with the at least one new tree node.

49. (Previously Presented) The computer readable medium of claim 40 wherein the generating a plurality of new document trees comprises converting at least one tree nodes to at least one new tree nodes associated with one or more new document elements, the one or more new document elements being associated with a second markup language.

50. (Previously Presented) The computer readable medium of claim 40 wherein the markup language is HTML.

51. (Previously Presented) The computer readable medium of claim 49 wherein the second markup language is HTML, CHTML, XHTML, XML, WML or HDML.

52. (Previously Presented) The computer readable medium of claim 43 wherein the one or more layout constraints assigned to the plurality of tree nodes include a vertical column or a horizontal row over a set of descendant nodes of one of the plurality of tree nodes.

53. (Previously Presented) The computer readable medium of claim 43 wherein the sizing parameters comprise a scalable width, a minimum width, an image area and a character number.

54. (Previously Presented) The computer readable medium of claim 43 wherein one of the sizing parameters assigned to one of the plurality of tree nodes is a cumulative summation of corresponding values of the same sizing parameter of one or more of its child nodes.

55. (Previously Presented) The computer readable medium of claim 52 wherein a value of the one of the sizing parameters is determined as a cumulative summation, over a set of the one or more layout constraints assigned to the one of the plurality of tree nodes, of maximum corresponding value of the same sizing parameter within the set of descendant nodes associated with the set of the one or more layout constraints.

56. (Previously Presented) The computer readable medium of claim 52 wherein one of the sizing parameters assigned to the one of the plurality of tree nodes has a value no less than at least one corresponding value of the same sizing parameter of the set of descendant nodes associated with the vertical column constraint said.

57. (Previously Presented) The computer readable medium of claim 52 wherein one of the sizing parameters assigned to the one of the plurality of tree nodes has a value no less than a cumulative summation of at least one corresponding value of the same sizing parameter of the set of descendant nodes associated with the horizontal row constraint.

58. (Previously Presented) The computer readable medium of claim 53 wherein the minimum width sizing parameter of the oversized tree node has a value exceeding a width threshold value associated with the one of the plurality of layout constraints.

59. (Previously Presented) The computer readable medium of claim 52 wherein the splitting or partitioning modifies the horizontal row layout constraint assigned to the oversized tree node.

60. (Previously Presented) The computer readable medium of claim 40 wherein the generating a plurality of new document trees comprises composing a catalog document tree, containing tree nodes linked to the new document trees, to provide a summary sizing information for at least one new document tree and the hierarchical linking relationship amongst the new document trees.

61. (Previously Presented) The computer readable medium of claim 40 wherein the structured data is a structured document in a second markup language.

62. (Previously Presented) The computer readable medium of claim 40 wherein the browser device is palmtops, PDAs or data-enabled cell phones wirelessly connected with a small display areas and processing capacities.

63. (Currently Amended) The method of claim 1, wherein ~~the document elements has an order according to the source document and the updated structured document, wherein the new document elements are ordered according to the order, and wherein the updated structured document includes a third ordered list of document elements having an order according to the first ordered list of document elements and the second ordered list of document elements, wherein the new document trees are ordered based on an order of the new document elements.~~

64. (Currently Amended) The method of claim 63, wherein the new document trees include a first new document tree and a second new document tree, the first new document tree having a first new document tree node associated with first new document elements converted from first document elements of the updated structured document elements, the second new document tree having a second new document tree node associated with second new document elements converted from second document elements of the updated structured document elements, and wherein ~~the order of the new document tree between the first new document tree and the second new document tree are ordered in the new~~

document tree according to is based on the order of document elements between the first document elements and the second document elements based on the order.

65. (Previously Presented) The method of claim 64, wherein the first new document tree includes a new tree node associated with a hyperlink element linking the second new document tree.

66. (Previously Presented) The method of claim 65, wherein the hyperlink element includes an order indicator indicating an order of the second new document tree within the ordered new document trees.

67. (Previously Presented) The method of claim 65, wherein the hyperlink element includes a hierarchical indicator indicating a relative level of hierarchy between the first new document tree and the second new document tree within the hierarchically linked new document trees.

68. (Currently Amended) The computer readable medium of claim 40, wherein ~~the document elements has an order according to the source document and the updated structured document, wherein the new document elements are ordered according to the order, and wherein the updated structured document includes a third ordered list of document elements having an order according to the first ordered list of document elements and the second ordered list of document elements, wherein the new document trees are ordered based on an order of the new document elements.~~

69. (Currently Amended) The computer readable medium of claim 68, wherein the new document trees include a first new document tree and a second new document tree, the first new document tree having a first new document tree node associated with first new document elements converted from first document elements of the updated structured document elements, the second new document tree having a second new document tree node associated with second new document elements converted from second document elements of the updated structured document elements, and wherein ~~the order of the new document tree between~~ the first new document tree and the second new document tree is based on the order of document elements between are ordered in the new document tree according to the first document elements and the second document elements based on the order.

70. (Previously Presented) The computer readable medium of claim 69, wherein the first new document tree includes a new tree node associated with a hyperlink element linking the second new document tree.

71. (Previously Presented) The computer readable medium of claim 70, wherein the hyperlink element includes an order indicator indicating an order of the second new document tree within the ordered new document trees.

72. (Previously Presented) The computer readable medium of claim 70, wherein the hyperlink element includes a hierarchical indicator indicating a relative level of hierarchy between the first new document tree and the second new document tree within the hierarchically linked new document trees.

73. (Currently Amended) An apparatus for structured document transcoding, comprising:

means for generating in response to receiving a source document from an element of
a structured document including a first ordered list of document elements in
a markup language, a source document based on a document element of the
first ordered list of document elements, the source document including a
second ordered list of document elements in the markup language~~replacing~~
~~the element to update the structured document;~~

means for replacing the document element with the second ordered list of document
elements to insert the source document into the first ordered list of
document elements to update the structured document;

means for building a document tree including a plurality of tree nodes associated with
~~document elements from the source document and of~~ the updated structured
document;

means for generating a plurality of new document trees ~~from~~according to the
document tree such that the plurality of new document trees are ordered and
hierarchically linked;

means for determining sizing parameters for one or more new tree nodes of at least
one of the new document trees; and

means for producing, from the at least one of the new document trees, one structured
data such that it is suitable for ~~input to~~ a browser to render in a browser
device,

wherein the one or more new tree nodes including one root node and one or more leaf

nodes, the determined sizing parameters of the root node satisfying constraints associated with a display area and processing capacity for the browser, each of the one or more new tree nodes except the root node having a single parent node belonging to the one or more new tree nodes and each of the one or more new tree nodes except the one or more leaf nodes having at least one child node belonging to one or more new tree nodes, and wherein each leaf node is associated with no more than one of the plurality of new document trees.